[Review of the book Handbook of Coding Theory I, II, V.S. Pless & W.C. Huffman, 2001]

van Dam, E.R.

Published in:
Nieuw Archief voor Wiskunde (Serie V)

Publication date:
2001

V.S. Pless and W.C. Huffman (eds.), *Handbook of coding theory I, II.* Amsterdam: Elsevier, 1998, 2169 p., prijs f. 650,- (hc). ISBN 0-444-50088-X.

This Handbook is one of those that any library in Mathematics, Information Sciences, or Computer Science should have. The editors write, and I agree, that "the audience for this Handbook can range from an active researcher in coding theory to someone beginning to explore this far reaching subject". The handbook consists of two volumes. Volume I contains *Part 1: Algebraic Coding*, and deals with the algebraic structure of codes. It contains the following chapters: An introduction to algebraic codes (Pless, Huffman, Brualdi; 138 p.); Coding constructions (Pless; 36 p.); Self-dual codes (Rains, Sloane; 118 p.); Bounds on the size of linear codes (Brouwer; 168 p.); An updated table of the best binary codes known (Litsyn; 36 p.); Universal bounds for codes and designs (Levenshtein; 150 p.); Complexity issues in coding theory (Barg; 106 p.); Covering radius (Brualdi, Litsyn, Pless; 72 p.); Quadratic residue codes and divisibility (Ward; 44 p.); Algebraic geometry codes (Høholdt, Van Lint, Pellikaan; 92 p.); Open problems in cyclic codes (Charpin; 102 p.); The algebraic theory of convolutional codes (McEliece; 74 p.). The first chapter, by the editors, is a good introduction to the subject of coding, and provides the basics for the other chapters.

Volume II contains two parts: *Part 2: Connections* explores the connections between coding theory and other parts of mathematics and computer science (mainly other parts of combinatorics). It consists of the chapters: Codes and number theory (Honkala, Tietäväinen; 54 p.); Coding theory at work in cryptography and vice versa (Van Tilborg; 34 p.); Codes and designs (Tonchev; 40 p.); Polynomial codes and finite geometries (Assmus, Key; 76 p.); Codes and groups (Huffman; 96 p.); Codes and association schemes: Basic properties of association schemes relevant to coding (Camion; 126 p.).

Furthermore, Volume II contains *Part 3: Applications*, which deals with, no surprise, the applications of coding. It contains the following chapters: Decoding of cyclic codes and codes on curves (Blahut; 66 p.); Constrained systems and coding for recording channels (Marcus, Roth and Siegel; 130 p.); Sequences with low correlation (Helleseth, Vijay Kumar; 90 p.); Array codes (Blaum, Farrell, Van Tilborg; 56 p.); Concatenated codes and their multilevel generalizations (Dumer; 78 p.); Trellis structure of codes (Vardy; 130 p.); Deep space applications (Wicker; 51 p.). This listing of the chapters of the Handbook is a good indication of its contents. For more information on each of the chapters we refer to their separate reviews in Zentralblatt Math.

The Handbook is set up in such a way that each chapter provides its own contents and extensive bibliography, with most chapters having over 100 references to the literature. Vardy's chapter "Trellis structure of codes" even has a seperate "guide to the literature".

The only drawback of the Handbook is its Subject Index. Especially for a Handbook the index is an important part, as many readers will use the Handbook as some kind of encyclopaedia. However, I have occasionally been put on the wrong track by the Subject index. For example, if one wants to

find information on *Kerdock codes*, the Subject index refers to several pages where there is absolutely no information on such codes. Another example is *uniformly packed code* for which there is no reference to page 134, where the basic definition of such a code is given. Let the user of the Handbook be warned. Nevertheless, this drawback should not be a reason not to use this Handbook, for it contains a lot of valuable, both basic and advanced information on Coding Theory.

Having used the Handbook of Coding Theory for some time now, I am sure that it can be very useful to any researcher or teacher in the field of coding or a related field.

E.R. van Dam